





## Improvements in or relating to a vehicle seat safety arrangement

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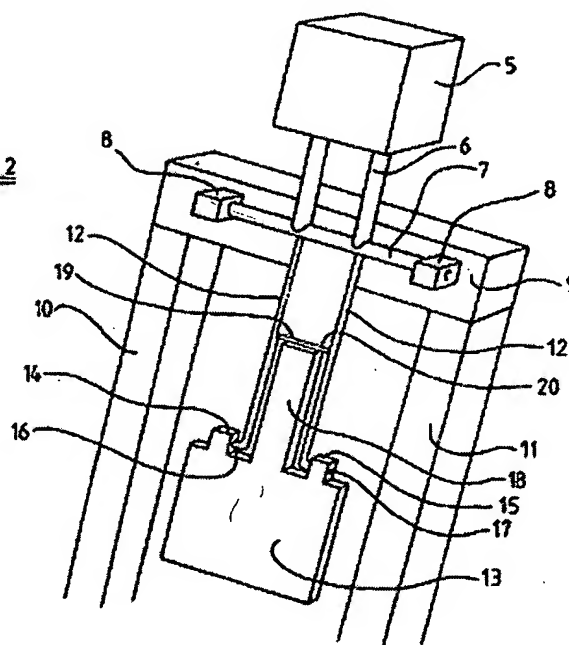
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### Abstract of GB2373177

A vehicle seat 1 has a head-rest 5 which is mounted for movement about a horizontal axis defined by a bar 7. Depending arms 12 extend downwardly in to the back of the seat and carry a pressure plate 13 at a position behind the torso of the occupant of the seat so that pressure applied to the pressure plate 13 (eg. during an impact) will cause the lower section of plate 13 to move rearward towards (Fig 3), the upper portion 18 to move forwards and the headrest 5 to move forward relative about bearings 8 which are enclosed within frame member 9. Pressure plate 13 is pivotally connected 14-17 to arms 12 to enable the arrangement to pivot to the maximum extent in a situation where the rear part of the seat is rigid, for example if the seat is a rear seat in a motor vehicle.

**FIG 2**



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**A4L LBEP L109 L147**

(56) Documents Cited

**GB 2318729 A**

**GB 2316862 A**

**US 6033018 A**

**US 5795019 A**

**GB 2316863 A**

**WO 1998/009838 A**

**US 6033017 A**

**US 5378043 A**

(58) Field of Search

**UK CL (Edition S ) A4L LBEP LBEQ**

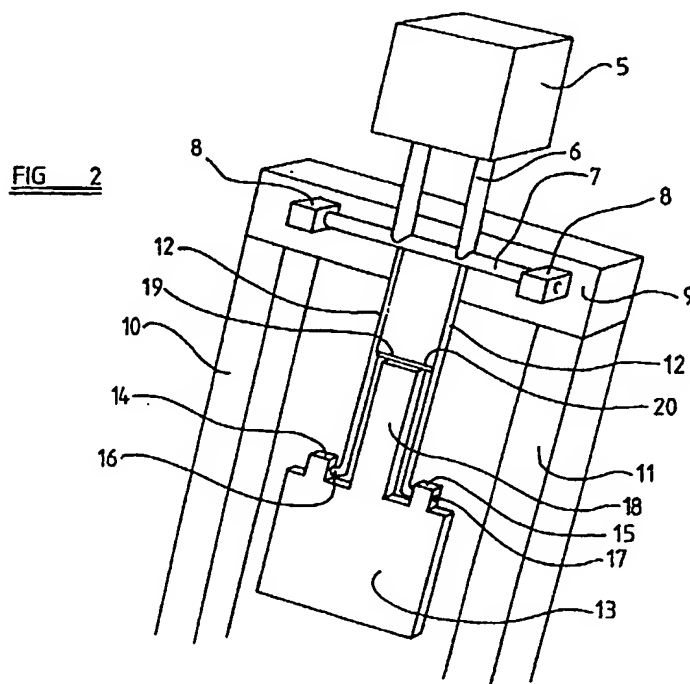
**INT CL<sup>7</sup> B60N 2/48**

**Online: EPODOC, WPI & PAJ.**

(54) Abstract Title

**Improvements in or relating to a vehicle seat safety arrangement**

(57) A vehicle seat 1 has a head-rest 5 which is mounted for movement about a horizontal axis defined by a bar 7. Depending arms 12 extend downwardly in to the back of the seat and carry a pressure plate 13 at a position behind the torso of the occupant of the seat so that pressure applied to the pressure plate 13 (eg. during an impact) will cause the lower section of plate 13 to move rearward towards (Fig 3), the upper portion 18 to move forwards and the headrest 5 to move forward relative about bearings 8 which are enclosed within frame member 9. Pressure plate 13 is pivotally connected 14-17 to arms 12 to enable the arrangement to pivot to the maximum extent in a situation where the rear part of the seat is rigid, for example if the seat is a rear seat in a motor vehicle.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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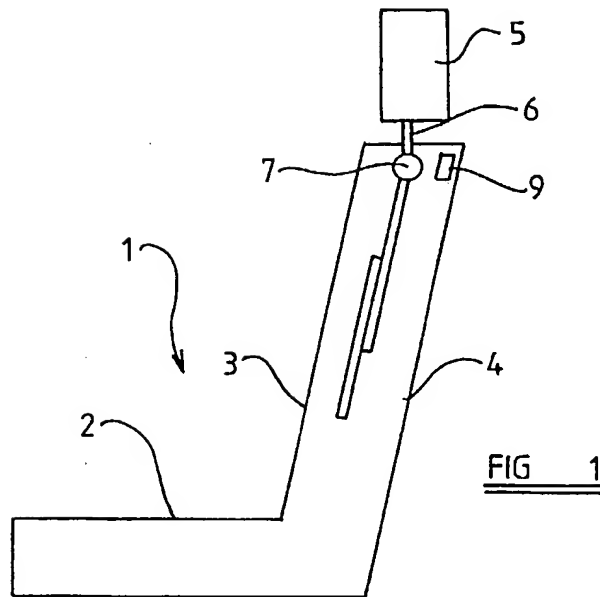
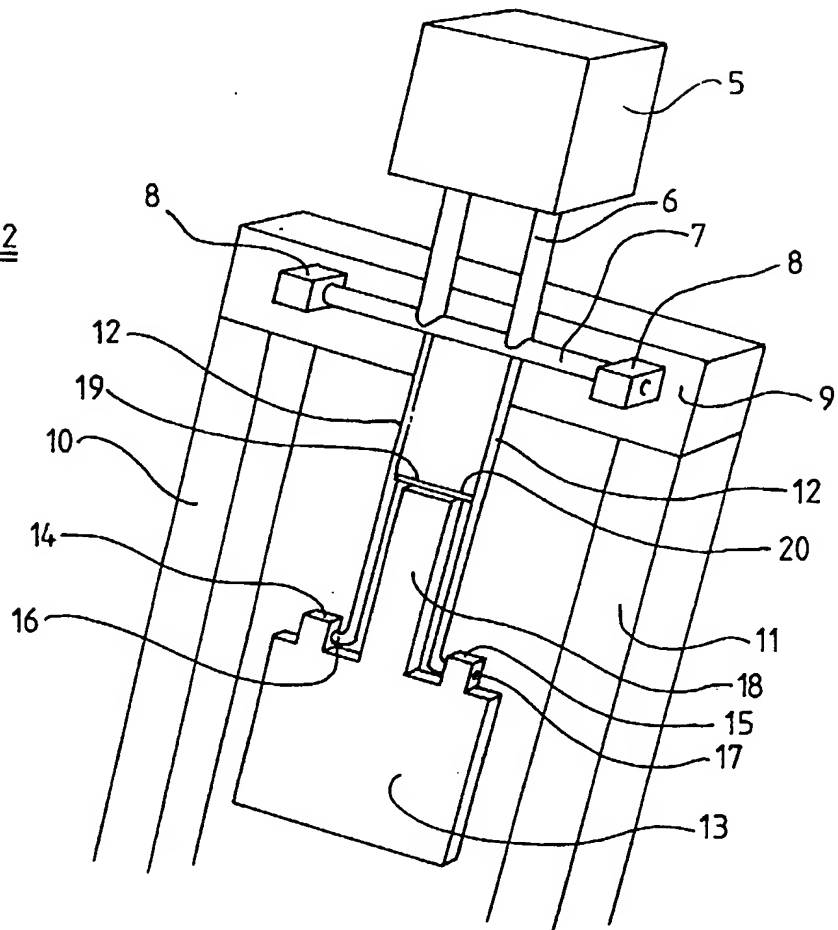


FIG 2



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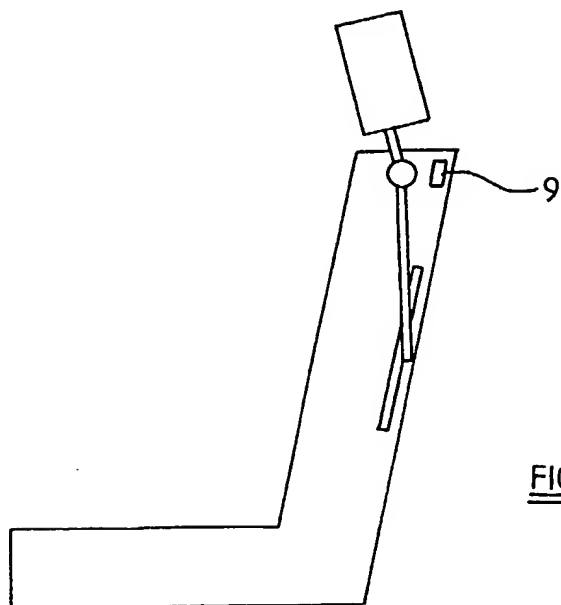


FIG 3



**DESCRIPTION OF INVENTION****"IMPROVEMENTS IN OR RELATING TO A SAFETY ARRANGEMENT"**

**THE PRESENT INVENTION** relates to a safety arrangement, and more particularly relates to a safety arrangement incorporated in a vehicle seat.

It is known to use, in a vehicle, a seat which is provided with a head-rest mounted on the back of the seat, the head-rests being adapted to move forwardly in the event that a rear impact should occur to provide protection for the occupant of the seat in order to minimise, or obviate whiplash injuries. Such a head-rest may be termed an "active" head-rest.

It has been proposed previously to provide an active head-rest which is activated when the occupant of the seat is pressed into the back-rest of the seat, as a consequence of a rear impact situation. Such a prior proposed arrangement incorporates a head-rest which is mounted for pivotal movement about a horizontal axis adjacent the top of the seat, the head-rest being connected, by appropriate arms, to a pressure plate which is mounted within the back-rest of the seat. As the torso of the occupant of the seat is pressed into the back-rest of the seat during a rear impact, the pressure plate is moved in a rearward direction, thus causing the head-rest itself to move forwardly, so that the head-

rest is brought into a position immediately behind the head of the occupant. An arrangement of this type is shown in US-A-5,378,043.

This prior proposed arrangement is intended for use in the front seat of a motor vehicle. Typically the front seat of a motor vehicle has a back-rest formed from an inverted "U"-shaped frame, with appropriate springing and padding filling the area between the parallel arms of the frame. Typically both the forward facing side and the rearward facing side of the back-rest are made to be soft and flexible so that the seat is not only comfortable for a person sitting in the seat, but also is not uncomfortable for the knees of a person sitting in the seat behind. Thus, in the prior art arrangement, the pressure plate can move rearwardly relative to the inverted "U"-shaped frame when a rear impact occurs.

In many vehicles, the rear part of the back-rest of a rear seat is constituted by a rigid panel. One reason for this is that typically the rear part of the back-rest of the rear seat forms an upright wall defining part of the boot or trunk. This wall must be sufficiently strong to prevent any luggage present in the boot or trunk from entering the passenger compartment in a frontal impact situation. Also, in many cases the back-rest of the rear seat may fold downwardly, and then the panel at the back of the back-rest forms part of a load-bearing platform.

If a head-rest of the type described in US-A-5,378,043 were to be mounted in the back-rest of a rear seat, having a rigid rear panel, the pressure plate would, in a rear impact situation, almost immediately engage the rigid rear panel, and thus the head-rest would not be moved sufficiently forwardly to prevent whiplash injuries.

Whilst it might be possible to make the back-rest "thicker", thus creating more space for movement of the pressure plate, car manufacturers tend to prefer seats that are as thin and as light as possible. Whilst one might contemplate providing a hatch in the rigid plate, adapted to open in the event of a rear impact, to allow the pressure plate to move rearwardly, it is very difficult to provide a hatch whilst still maintaining a rear panel for the seat, which is flat. A flat surface for the rear panel is important when the back-rest of the rear seat is folded forwardly so that the panel forms a load-bearing platform. Also, of course, if the boot or trunk of the vehicle is full of luggage, luggage would be adjacent the hatch and would prevent the hatch from opening. It is to be understood that if the pressure plate is located closer to the front surface of the back-rest of the seat, the pressure plate would prove to be uncomfortable.

The present invention seeks to provide an improved safety arrangement.

According to this invention there is provided a safety arrangement for a motor vehicle, the safety arrangement comprising a head-rest, means to mount the head-rest for pivotal movement about a predetermined horizontal axis adjacent the upper part of the back-rest of the seat, and depending means adapted to extend downwardly within the back-rest of the seat beneath the predetermined axis, and which carry a pressure plate to be located within the back-rest at a position behind the torso of an occupant of the seat, so that pressure applied to the pressure plate will cause the head-rest to move, the pressure plate being pivotally connected to the depending means.

Preferably the depending means comprise parallel arms.

Conveniently pressure plate is provided with an integral locating element extending upwardly above the axis about which the pressure plate is pivotally connected to the depending means, the locating element being releasably connected to the depending means.

Advantageously the locating element is connected to the depending means by means of at least one spring clip.

Alternatively the locating element is connected to the depending means by means of at least one frangible element.

Preferably the means to mount the head-rest comprise a substantially horizontal bar adapted to be mounted, by means of bearings, on a frame within the back-rest of the seat, the axis of the horizontal rod being the said predetermined axis, the head-rest being connected to the bar.

Conveniently the depending means are connected to and depend from the bar.

In one embodiment of the invention the rear of the back-rest is provided with a rigid panel.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a schematic side elevational view of a vehicle seat incorporating a safety arrangement in accordance with the invention,



FIGURE 2 is a front view of the seat of Figure 1,

FIGURE 3 is a view corresponding to Figure 1 showing the seat in an alternate condition.

In the described embodiment of the invention a head-rest is provided on a vehicle seat, and the head-rest is adapted to move forwardly when there is a rear impact to reduce or obviate whiplash injuries.

Referring to Figure 1, a vehicle seat 1, intended for use as a rear seat, comprises a squab 2 and back-rest 3. The rear face of the back-rest 3 is in the form of a rigid panel 4. The back-rest 3 is associated with a head-rest 5. The head-rest 5 is initially mounted in position above the back-rest of the seat and is supported by a pair of parallel support arms 6. The parallel support arms 6 are connected to a pivotally mounted horizontal bar 7. The pivotally mounted bar 7 has opposed ends thereof supported in bearings 8 which are mounted on a horizontal frame member 9 located in the back-rest of the seat, the horizontal frame member 9, together with two vertical parallel arm members 10, 11, forming a substantially rigid inverted "U"-shaped frame contained within the seat.

Two further parallel arms 12 are also connected to the horizontal bar 7, the arms 12 depending within the back-rest of the seat. The lower ends of the arms 12 carry a pressure plate 13. The pressure plate 13 is provided with upwardly extending lugs 14, 15, which each receive an outwardly directed pivot pin 16, 17, carried at the lower ends of the arms 12. The pressure plate can thus pivot about the axis of the co-aligned pins 16, 17. In the described embodiment the pressure plate can only pivot in one pivotal direction from the

initial position shown in Figure 3. Pivotal movement in the opposite direction is prevented, for example by a stop, a ratchet or equivalent device. The pressure plate 13 incorporates an upwardly directed locating arm 18, which extends upwardly between the parallel arms 12. The upper end of the locating arm 18 is releasably connected to the arms 12 by releasable catches 19, 20, which may be spring catches, or which may be catches constituted by frangible elements adapted to break when subjected to a predetermined force. One or more springs, or other resilient means (not shown), may be provided to bias the head-rest to the "initial" position shown in Figure 1.

It is to be appreciated that when the seat is in ordinary use, the head-rest will be substantially stationary. However, when a vehicle in which the seat is mounted is subjected to a rear impact, the torso of an occupant of the seat will move so that the torso is effectively forced into the back-rest 3 of the seat. The torso of the occupant will then engage the pressure plate 13, and the combination of the pressure plate 13, the parallel arms 12, the horizontal bar 7, the arm 6 and the head-rest 5, will pivot about the axis of the bar 7, the ends of the rod 7 rotating within the bearings 8. The head-rest 5 will thus begin to move forwardly.

The lower-most edge of the pressure plate 13 will strike the rigid plate 4 provided at the rear of the back-rest 3. Continuing pressure applied to the pressure plate 13 by the torso of the occupant of the seat will cause the clips 19, 20 to be released so that the upper part of the locating arm 18 is no longer connected to the depending arms 12. The pressure plate is then free to rotate about the axis of the co-aligned pins 16, 17, in its single direction of pivotal movement. As can be seen from Figure 3, this means that the pressure plate 13 will effectively pivot about the axis of the pins 16, 17, and also its own lower-most edge, which is engaging the rigid panel 4, will slide down the panel

4, whilst the upper part of the pressure plate 13 continues to move rearwardly, thus moving the lower-most ends of the depending arms 12 to a rearward position in which they substantially abut the rear panel 4. This enables the head-rest 5 to move forward sufficiently to engage the head of the occupant of the seat, to minimise or obviate the risk of a whiplash injury occurring.

It is to be appreciated that the described movement of the head-rest being effected against a bias provided by the springs or resilient means, if provided

In a further embodiment of the invention the head-rest and the depending parallel arms are mounted on a horizontal rotatable bar which extends between the two vertical parallel arm members that form the frame in the back of the seat. The rotatable bar itself forms the transverse part of the inverted "U" shaped frame.

In the present Specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following Claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

## CLAIMS:

1. A safety arrangement for a motor vehicle, the safety arrangement comprising a head-rest, means to mount the head-rest for pivotal movement about a predetermined horizontal axis adjacent the upper part of the back-rest of the seat, and depending means adapted to extend downwardly within the back-rest of the seat beneath the predetermined axis, and which carry a pressure plate to be located within the back-rest at a position behind the torso of an occupant of the seat, so that pressure applied to the pressure plate will cause the head-rest to move, the pressure plate being pivotally connected to the depending means.
2. An arrangement according to Claim 1 wherein the depending means comprise parallel arms.
3. An arrangement according to Claim 1 or Claim 2 wherein the pressure plate is provided with an integral locating element extending upwardly above the axis about which the pressure plate is pivotally connected to the depending means, the locating element being releasably connected to the depending means.
4. An arrangement according to Claim 3 wherein the locating element is connected to the depending means by means of at least one spring clip.
5. An arrangement according to Claim 3 wherein the locating element is connected to the depending means by means of at least one frangible element.

6. An arrangement according to any one of the preceding Claims wherein the means to mount the head-rest comprise a substantially horizontal bar adapted to be mounted, by means of bearings, on a frame within the back-rest of the seat, the axis of the horizontal rod being the said predetermined axis, the head-rest being connected to the bar.
7. An arrangement according to Claim 6 wherein the depending means are connected to and depend from the bar.
8. An arrangement according to any one of the preceding Claims wherein the rear of the back-rest is provided with a rigid panel.
9. A safety arrangement substantially as herein described with reference to and as shown in the accompanying drawings.
10. Any novel feature or combination of features disclosed herein.



INVESTOR IN PEOPLE

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Claims searched: All (1-10)

Examiner: David J Evans  
Date of search: 16 May 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A4L (LBEP, LBEQ)

Int Cl (Ed.7): B60N (2/48)

Other: Online: EPODOC, WPI & PAJ.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2316862 A (AUTOLIV) document of very general use concerning safety head-rests.	-
A	GB 2316863 A (AUTOLIV) document of partial interest.	-
A	GB 2318729 A (RECARO) document of general interest, especially concerning motion of elements 20 & 24 relative to 34.	-
A	US 6033017 A (ELQADAH) whole document of interest, see especially fig 3.	-
A	US 6033018 A (FOHL) document of general interest concerning motion about horizontal axis.	-
A	US 5795019 A (WIECLAWSKI) whole document relevant, in particular see figs 2 & 4-5.	-
A	US 5378043 A (VIANO) whole document relevant (* mentioned prior-art document).	-
A	WO 98/09838 A (SAAB) whole document relevant, see figs 2-4 especially	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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